CSC3320 System Level Programming
Lab Assignment 4 - Part 1 (In- Lab)
Instructor: Fil Rondel

Purpose: Practices on the grep family commands to process texts in files.

Note: Please follow the instructions below, and write a report by answering the questions and upload the report (named as Lab4_P1_FirstNameLastName.pdf or Lab4_P1_FirstNameLastName.doc) to Google Classroom.

Please add the lab assignment NUMBER and your NAME at the top of your file sheet.

Open your terminal and connect to snowball server. Change your directory to your home directory (cd ~), and then create a new directory named as "Lab4" (mkdir Lab4). After that, go to directory Lab4 (cd Lab4) and please download the file "CSC_Course.txt" by the following command (internet access required):

cp /home/frondel/Public/CSC_Course.txt CSC_Course.txt Be sure it succeeds using "ls" to see the file name "CSC_Course.txt" listed.

Try the following commands step by step and finish the required tasks from step 4) to step 16).

Note: marks a single space.
1) $more CSC_Course.txt
   Check the content of "CSC_Course.txt" using more.
   Note: When viewing the file, you may need to use command f (forward one screen), b (backward one screen) and q(quit).

2) $grep 'CSC 3320' CSC_Course.txt
   Note: there is a single space between "CSC" and "3320" Output the lines containing the string "CSC 3320"(search the course the number of which is "CSC 3320")

3) $grep -i 'CSC 3320' CSC_Course.txt
   Output the lines containing the string "CSC 3320" via ignoring case (search the information related to CSC3320)

4) $ grep 'CSC 3' CSC_Course.txt
   Attach a screenshot of the output and describe what this command

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```
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ grep 'CSC 3' CSC_Course.txt
CSC 3210        Computer Organization and Programming
CSC 3320        System-Level Programming
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3210 with a C or higher
Prerequisites   CSC 3210 with grade of C or higher
Prerequisites   CSC 3320 and either MATH 3020 or MATH 3030 with a C or higher
Prerequisites   CSC 2720 and CSC 3320 with grades of "C" or higher.Students must meet the Computer Science
 Major Eligibility Requirement in order to enroll in this course
Prerequisites   CSC 2720 and CSC 3320 with grades of "C" or higher
Prerequisites   CSC 2720 (Data Structures) and CSC 3320 (System Level Programming)
Prerequisites   CSC 2720 Data Structure and CSC 3320 System-Level Programming with grades of C or better
Prerequisites   CSC 3210 Computer Organization and Programming, CSC 2720 Data Structure
Prerequisites   CSC 2720 (Data Structures) and CSC 3320 (System Level Programming)
Prerequisites   CSC 3210 and CSC 3320 with grades of C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 2720, CSC 3210, and CSC 3320 with a C or higher
Prerequisites   CSC 2720 and CSC 3210 with grades of "C" or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with a C or higher
Prerequisites   CSC 3320 with grade of "C" or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with a grade of C or higher
Prerequisites   CSC 3320 with a grade of C or higher
[mpatel185@gsuad.gsu.edu@snowball Lab4]$
```

Command searches string 'CSC 3' in the file.

5) $ grep 'CSC 3|CSC 1' CSC_Course.txt
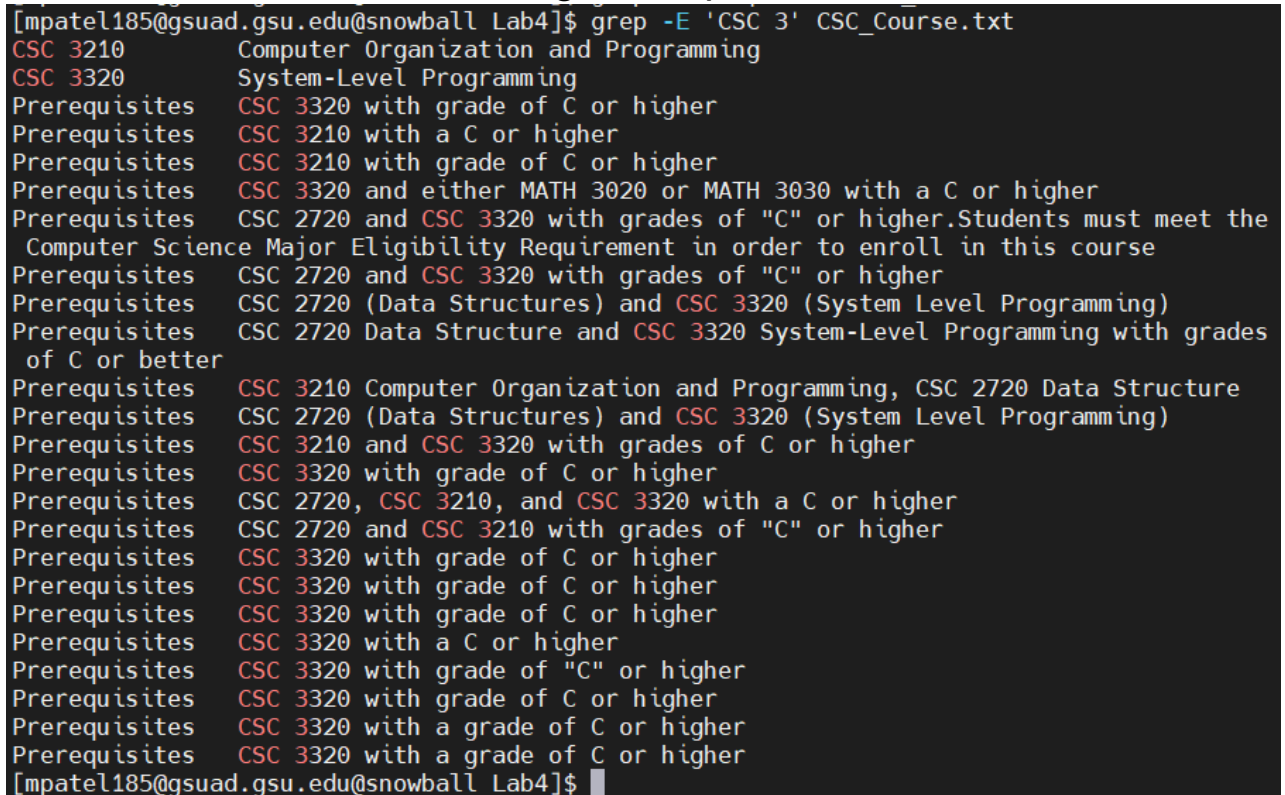   Attach a screenshot of the output and describe what this

command does.

N/A

The command searches 'CSC 3' and 'CSC 1' in the file.

6) $ grep -E 'CSC 3|CSC 1' CSC_Course.txt

Attach a screenshot of the output and describe what this command does. Use extend regular expression

```
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ grep -E 'CSC 3' CSC_Course.txt
CSC 3210        Computer Organization and Programming
CSC 3320        System-Level Programming
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3210 with a C or higher
Prerequisites   CSC 3210 with grade of C or higher
Prerequisites   CSC 3320 and either MATH 3020 or MATH 3030 with a C or higher
Prerequisites   CSC 2720 and CSC 3320 with grades of "C" or higher.Students must meet the
 Computer Science Major Eligibility Requirement in order to enroll in this course
Prerequisites   CSC 2720 and CSC 3320 with grades of "C" or higher
Prerequisites   CSC 2720 (Data Structures) and CSC 3320 (System Level Programming)
Prerequisites   CSC 2720 Data Structure and CSC 3320 System-Level Programming with grades
 of C or better
Prerequisites   CSC 3210 Computer Organization and Programming, CSC 2720 Data Structure
Prerequisites   CSC 2720 (Data Structures) and CSC 3320 (System Level Programming)
Prerequisites   CSC 3210 and CSC 3320 with grades of C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 2720, CSC 3210, and CSC 3320 with a C or higher
Prerequisites   CSC 2720 and CSC 3210 with grades of "C" or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with a C or higher
Prerequisites   CSC 3320 with grade of "C" or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with a grade of C or higher
Prerequisites   CSC 3320 with a grade of C or higher
[mpatel185@gsuad.gsu.edu@snowball Lab4]$
```

-E makes the pattern as extended regular expression

7) $ egrep 'CSC 3|CSC 1' CSC_Course.txt
Attach a screenshot of the output and describe what this command does.

```
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ egrep 'CSC 3|CSC 1' CSC_Course.txt
CSC 1010        Computers and Applications
CSC 1301        Principles of Computer Science I
CSC 1302        Principles of Computer Science II
Prerequisites   CSC 1301 with a "C" or higher
Prerequisites   CSC 1301 or CSC 2301 with a C or higher, or permission of instructor
Prerequisites   (CSC 1301 or DSCI 1301) and (MATH 1113 or MATH 2211) with a C or higher.
Prerequisites   CSC 1302, MATH 2211, and CSC 2510 or MATH 2420 with grades of "C" or high
er
Prerequisites   CSC 1301 and CSC 1302 with a C or higher or permission of the department
CSC 3210        Computer Organization and Programming
Prerequisites   CSC 1302, and CSC 2510 or MATH 2420 with A C or higher
CSC 3320        System-Level Programming
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3210 with a C or higher
Prerequisites   CSC 3210 with grade of C or higher
Prerequisites   CSC 3320 and either MATH 3020 or MATH 3030 with a C or higher
Prerequisites   CSC 2720 and CSC 3320 with grades of "C" or higher.Students must meet the
 Computer Science Major Eligibility Requirement in order to enroll in this course
Prerequisites   CSC 2720 and CSC 3320 with grades of "C" or higher
Prerequisites   CSC 2720 (Data Structures) and CSC 3320 (System Level Programming)
Prerequisites   CSC 2720 Data Structure and CSC 3320 System-Level Programming with grades
 of C or better
Prerequisites   CSC 3210 Computer Organization and Programming, CSC 2720 Data Structure
Prerequisites   CSC 2720 (Data Structures) and CSC 3320 (System Level Programming)
Prerequisites   CSC 3210 and CSC 3320 with grades of C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 2720, CSC 3210, and CSC 3320 with a C or higher
Prerequisites   CSC 2720 and CSC 3210 with grades of "C" or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with a C or higher
Prerequisites   CSC 3320 with grade of "C" or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with a grade of C or higher
Prerequisites   CSC 3320 with a grade of C or higher
[mpatel185@gsuad.gsu.edu@snowball Lab4]$
```

Searches for both strings and because its egrep the code works.

8) $ fgrep '3.000 Credit hours' CSC_Course.txt Attach a
   screenshot of the output and describe what this command does.

N/A

No line contains the string

9) $ fgrep -x '3.000▮Credit▮hours' CSC_Course.txt Attach a screenshot of the output and describe what this command does. Only match the whole line

N/A

No line contains the string

10) $ grep 'CSC.*Programming' CSC_Course.txt Attach a screenshot of the output and describe what this command does.

```
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ grep 'CSC.*Programming' CSC_Course.txt
CSC 2301        Introduction to Python Programming
CSC 2302        Python Programming for Data Science
CSC 3210        Computer Organization and Programming
CSC 3320        System-Level Programming
Prerequisites   CSC 2720 (Data Structures) and CSC 3320 (System Level Programming)
CSC 4225        Internetwork Programming
Prerequisites   CSC 2720 Data Structure and CSC 3320 System-Level Programming with grades
 of C or better
Prerequisites   CSC 3210 Computer Organization and Programming, CSC 2720 Data Structure
Prerequisites   CSC 2720 (Data Structures) and CSC 3320 (System Level Programming)
CSC 4330        Programming Language Concepts
CSC 4370        Web Programming
CSC 4380        Windowing Systems Programming
CSC 4760        Big Data Programming
Students must meet the Computer Science Major Eligibility Requirement in order to enroll
in this course. Crosslisted with CSC 6760. This course will cover the technologies, tools
, frameworks and languages that are most commonly used in Big Data Programming. Focus wil
l be on algorithms for analyzing and mining massive datasets, graphs and social network d
ata. Topics include the storage, management, processing and analysis of massive datasets,
 as well as Big Data governance, security, and privacy issues.
CSC 4840        Advanced Computer Graphics Programming
[mpatel185@gsuad.gsu.edu@snowball Lab4]$
```

Lines that have CSC <anything in between> Programming is shown

11) $ grep '^CSC.*Programming$' CSC_Course.txt Attach a screenshot of the output and describe what this command does.

```
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ grep '^CSC.*Programming$' CSC_Course.txt
CSC 2301        Introduction to Python Programming
CSC 3210        Computer Organization and Programming
CSC 3320        System-Level Programming
CSC 4225        Internetwork Programming
CSC 4370        Web Programming
CSC 4380        Windowing Systems Programming
CSC 4760        Big Data Programming
CSC 4840        Advanced Computer Graphics Programming
[mpatel185@gsuad.gsu.edu@snowball Lab4]$
```

Lines that start with CSC and end with Programming are shown

12) $ grep --color 'CSC[^3]*3{2}' CSC_Course.txt Attach a
screenshot of the output and describe what this command does.

```
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ grep --color -w 'CSC [^3]*3{2}[^3]*' CSC_Course.
txt
```

N/A because {} are considered as special characters

13) $ egrep --color -w 'CSC[^3]*3{2}[^3]*' CSC_Course.txt Attach a screenshot of
the output and describe what this command does. -w Select only those
lines containing matches that form whole words.

```
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ egrep --color -w 'CSC [^3]*3{2}[^3]*' CSC_Course
.txt
CSC 3320        System-Level Programming
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 and either MATH 3020 or MATH 3030 with a C or higher
Prerequisites   CSC 2720 and CSC 3320 with grades of "C" or higher.Students must meet the
 Computer Science Major Eligibility Requirement in order to enroll in this course
Prerequisites   CSC 2720 and CSC 3320 with grades of "C" or higher
Prerequisites   CSC 2720 (Data Structures) and CSC 3320 (System Level Programming)
Prerequisites   CSC 2720 Data Structure and CSC 3320 System-Level Programming with grades
 of C or better
Prerequisites   CSC 2720 (Data Structures) and CSC 3320 (System Level Programming)
Prerequisites   CSC 3210 and CSC 3320 with grades of C or higher
Prerequisites   CSC 3320 with grade of C or higher
CSC 4330        Programming Language Concepts
Prerequisites   CSC 2720, CSC 3210, and CSC 3320 with a C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with a C or higher
Prerequisites   CSC 3320 with grade of "C" or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with a grade of C or higher
Prerequisites   CSC 3320 with a grade of C or higher
```

--color highlights the matches

14) $ grep 'CSC.*C++' CSC_Course.txt

+ is not a special character in basic regular expression

```
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ grep 'CSC.*C++' CSC_Course.txt
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ ▊
```

N/A because ++ is considered special characters

15) $ egrep 'CSC.*C\+\+' CSC_Course.txt

Attach a screenshot of the output and describe what this command does. Convert +

```
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ egrep 'CSC.*C\+\+' CSC_Course.txt
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ ▊
```

N/A because there are no lines that start with CSC and end with some word with start of 'C'

16) $ egrep 'CSC.*C++' CSC_Course.txt

Please only describe what this command does.

```
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ egrep 'CSC.*C++' CSC_Course.txt
CSC 1010        Computers and Applications
CSC 1301        Principles of Computer Science I
CSC 1302        Principles of Computer Science II
Prerequisites   CSC 1301 with a "C" or higher
Prerequisites   CSC 1301 or CSC 2301 with a C or higher, or permission of instructor
CSC 2510        Theoretical Foundations of Computer Science
Prerequisites   (CSC 1301 or DSCI 1301) and (MATH 1113 or MATH 2211) with a C or higher.
Prerequisites   CSC 1302, MATH 2211, and CSC 2510 or MATH 2420 with grades of "C" or higher
CSC 2920        Ethical and Social Issues in Computing
Prerequisites   CSC 1301 and CSC 1302 with a C or higher or permission of the department
CSC 3210        Computer Organization and Programming
Prerequisites   CSC 1302, and CSC 2510 or MATH 2420 with A C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3210 with a C or higher
CSC 4210        Computer Architecture
Prerequisites   CSC 3210 with grade of C or higher
CSC 4220        Computer Networks
Prerequisites   CSC 3320 and either MATH 3020 or MATH 3030 with a C or higher
CSC 4221        Wireless Networks & Mobile Computing
Prerequisites   CSC 2720 and CSC 3320 with grades of "C" or higher.Students must meet the Computer Science Major Eligibility Requirement in order to enroll in this course
CSC 4222        Cyber Security
Prerequisites   CSC 2720 and CSC 3320 with grades of "C" or higher
Prerequisites   CSC 2720 and either MATH 3020 or MATH 3030 with a C or higher
Prerequisites   CSC 2720 (Data Structures) and CSC 3320 (System Level Programming)
Prerequisites   CSC 4220 with grade of C or higher
Prerequisites   CSC 2720 Data Structure and CSC 3320 System-Level Programming with grades of C or better
Prerequisites   CSC 3210 Computer Organization and Programming, CSC 2720 Data Structure
CSC 4251        Computer Forensics
Prerequisites   CSC 2720 (Data Structures) and CSC 3320 (System Level Programming)
Prerequisites   CSC 2720 or DSCI 2720 with a C or higher. Students must meet the Computer Science Major Eligibility Requirement in order to enroll in this course.
Prerequisites   CSC 4210 with grade of C or higher
CSC 4310        Parallel and Distributed Computing
Prerequisites   CSC 3210 and CSC 3320 with grades of C or higher
CSC 4311        Cloud Computing
Prerequisites   CSC 2720 or DSCI 2720 with a C or higher. Students must meet the Computer Science Major Eligibility Requirement in order to enroll in this course.
Prerequisites   CSC 3320 with grade of C or higher
CSC 4330        Programming Language Concepts
Prerequisites   CSC 2720, CSC 3210, and CSC 3320 with a C or higher
CSC 4340        Compilers
Prerequisites   CSC 2720 and CSC 3210 with grades of "C" or higher
CSC 4350        Software Engineering — CTW
```

```
Prerequisites   CSC 4520 with a C or higher
Prerequisites   CSC 2720 with a grade of C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 2720 with a C or higher
Prerequisites   (CSC 2720 or DSCI 2720) and either MATH 3020 or MATH 3030 with a C or higher. Students must meet the Computer Science Major Eligibility Requirement in order to enr
oll in this course.
Prerequisites   CSC 2720, BIOL 1103K, [or BIOL 1103 and BIOL 1103L] and CHEM 1211K [or CHEM 1211 and CHEM 1211L] with grades of "C" or higher.Students must meet the Computer Scien
ce Major Eligibility Requirement in order to enroll in this course
CSC 4720         Human-Computer Interaction
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with a C or higher
Prerequisites   CSC 2720 with grade of C or higher
Prerequisites   CSC 2720 or DSCI 2720 with a C or higher. Students must meet the Computer Science Major Eligibility Requirement in order to enroll in this course.
Prerequisites   CSC 2720 with grade of C or higher
Prerequisites   CSC 2720 with a C or better
Prerequisites   CSC 2720 with a C or higher
CSC 4820         Interactive Computer Graphics
Prerequisites   CSC 3320 with grade of "C" or higher
Prerequisites   CSC 3320 with grade of C or higher
CSC 4840         Advanced Computer Graphics Programming
Prerequisites   CSC 3320 with a grade of C or higher
CSC 4841         Computer Animation
Prerequisites   CSC 3320 with a grade of C or higher
Prerequisites   CSC 4520 with a grade of C or better
Prerequisites   CSC 4850 or DSCI 4850 with a C or higher. Students must meet the Computer Science Major Eligibility Requirement in order to enroll in this course.
CSC 4940         Computer Science Internship
CSC 4980         Topics in Computer Science
CSC 4982         Undergraduate Research in Computer Science
CSC 4995         Directed Readings B.I.S.-CTW
[mpatel185@gsuad.gsu.edu@snowball Lab4]$
```

Highlights from CSC to the first letter C in the line

Optional Part:

1) $ sed -E -n 's/(CSC   3[0-9]{3})(.*)/\1/p' CSC_Course.txt Attach a screenshot of the output and describe what this command does.

```
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ sed -E -n 's/(CSC 3[0-9]{3})(.*)/\1/p' CSC_Course.txt
CSC 3210
CSC 3320
Prerequisites   CSC 3320
Prerequisites   CSC 3210
Prerequisites   CSC 3210
Prerequisites   CSC 3320
Prerequisites   CSC 2720 and CSC 3320
Prerequisites   CSC 2720 and CSC 3320
Prerequisites   CSC 2720 (Data Structures) and CSC 3320
Prerequisites   CSC 2720 Data Structure and CSC 3320
Prerequisites   CSC 3210
Prerequisites   CSC 2720 (Data Structures) and CSC 3320
Prerequisites   CSC 3210
Prerequisites   CSC 3320
Prerequisites   CSC 2720, CSC 3210
Prerequisites   CSC 2720 and CSC 3210
Prerequisites   CSC 3320
Prerequisites   CSC 3320
Prerequisites   CSC 3320
Prerequisites   CSC 3320
Prerequisites   CSC 3320
Prerequisites   CSC 3320
Prerequisites   CSC 3320
Prerequisites   CSC 3320
[mpatel185@gsuad.gsu.edu@snowball Lab4]$
```

Prints CSC 3 and [0-9] matches 0 to 9 digits and repetition of 3 ({3})

2) $ awk -F'-' '/(CSC 3[0-9]{3})(.*)/{print $1}' CSC_Course.txtAttach a screenshot of the output and describe what this command does.

```
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ awk -F'-' '/(CSC 3[0-9]{3})(.*)/{print $1}' CSC_Course.txt
CSC 3210        Computer Organization and Programming
CSC 3320        System
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3210 with a C or higher
Prerequisites   CSC 3210 with grade of C or higher
Prerequisites   CSC 3320 and either MATH 3020 or MATH 3030 with a C or higher
Prerequisites   CSC 2720 and CSC 3320 with grades of "C" or higher.Students must meet the Computer Science Major Eligibility Requirement in order to enroll in this course
Prerequisites   CSC 2720 and CSC 3320 with grades of "C" or higher
Prerequisites   CSC 2720 (Data Structures) and CSC 3320 (System Level Programming)
Prerequisites   CSC 2720 Data Structure and CSC 3320 System
Prerequisites   CSC 3210 Computer Organization and Programming, CSC 2720 Data Structure
Prerequisites   CSC 2720 (Data Structures) and CSC 3320 (System Level Programming)
Prerequisites   CSC 3210 and CSC 3320 with grades of C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 2720, CSC 3210, and CSC 3320 with a C or higher
Prerequisites   CSC 2720 and CSC 3210 with grades of "C" or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with a C or higher
Prerequisites   CSC 3320 with grade of "C" or higher
Prerequisites   CSC 3320 with grade of C or higher
Prerequisites   CSC 3320 with a grade of C or higher
Prerequisites   CSC 3320 with a grade of C or higher
[mpatel185@gsuad.gsu.edu@snowball Lab4]$
```

awk prints the string with given conditions

3) $ sed -E -n 's/(CSC☐ [0-9]{4})(☐-☐)(.*)/\3/p' CSC_Course.txt Attach a screenshot of the output and describe what this command does.

```
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ sed -E -n 's/(CSC [0-9]{4})( - )(.*)/\3/p' CSC_Course.txt
[mpatel185@gsuad.gsu.edu@snowball Lab4]$
```

N/A

4) $ sed -E -n 's/(CSC☐ [0-9]{4})(☐-☐)(.*)/\3/p' CSC_Course.txt| sort

Attach a screenshot of the output and describe what this command does.

```
[mpatel185@gsuad.gsu.edu@snowball Lab4]$ sed -E -n 's/(CSC [0-9]{4})( - )(.*)/\3/p' CSC_Course.txt| sort
[mpatel185@gsuad.gsu.edu@snowball Lab4]$
```

N/A